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August 4, 2003

VIA MESSENGER

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
Office of the Secretary
445-12th Street, S.W.
TW-A325
Washington, D.C. 20554

RE: Comments of Delphi Corporation

Amendment of Part 2 of the Commission's Rules to Realign the 76-81 GHz band and the Frequency Range Above 95 GHz Consistent with International Allocation Changes
ET Docket No. 03-102

Amendment of Part 2 of the Commission's Rules to Allocate Additional Spectrum to the Inter-Satellite, Fixed, and Mobile Services and to Permit Unlicensed Devices to Use Certain Segments in the 50.2-50.4 GHz and 51.4-71.0 GHz Bands
ET Docket No. 99-261

Dear Ms. Dortch:

On behalf of Delphi Automotive Systems Corporation ("Delphi"), transmitted herewith are an original and six (6) copies of Delphi's "Comments" in connection with the above-referenced proceeding.

If any questions arise with respect to these Comments, please do not hesitate to contact undersigned counsel.

Respectfully submitted,

Alan G. Fishel
Jeffrey E. Rummel

Enclosures

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
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Amendment of Part 2 of the Commission's	)	
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to Permit Unlicensed Devices to Use Certain	)	
Segments in the 50.2-50.4 GHz and 51.4-71.0	)	
GHz Bands	)	

COMMENTS OF
DELPHI CORPORATION

Respectfully submitted,

DELPHI CORPORATION

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Its Attorneys

Dated: August 4, 2003

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SUMMARY

In these comments, Delphi Corporation ("Delphi") submits that the Commission should not allow the introduction of radio astronomy service (RAS), space research or amateur site services (collectively, the "Proposed Services") into the 76–77 GHz band at this time. If the Commission does permit any of the Proposed Services in the 76–77 GHz band, it should only do so if it also finds that (i) such services must not interfere with vehicular radar systems; (ii) such services must accept interference from vehicular radar systems; and (iii) the existing technical parameters for vehicular radar will not be tightened as a result of the presence of such services in the 76-77 GHz band.

Every year, several million people in the U.S. are injured in automobile accidents. Over the past ten years, more than 400,000 people have died from motor vehicle accidents. The property damage caused by such accidents is overwhelming. Yet, so much of this death, injury, damage and disruption will not occur if vehicular radar systems become as ubiquitous as is currently anticipated. It is not an understatement to say that the vehicular radar systems on the road today, as well as anticipated next generation systems, may be the difference between life, and death or serious injury, for millions of U.S residents in the coming years. But to have this impact these systems must be given a full opportunity to benefit the public.

The vehicular radar industry has not only designed -- but it has produced and deployed to the public -- vehicular radar systems utilizing the 76-77 GHz band. U.S. sales of these products are growing, and there is every reason to believe that the U.S. numbers will continue to rise quickly as long as there are no regulatory impediments to such growth.

In 1995, the Commission made the 76-77 GHz band available for use by vehicular radar allocations, while concluding that because of safety considerations "unlicensed use of the 76-77 GHz band should be limited for the time being to vehicular radar systems." If anything, these safety considerations are even more prevalent today then they were then.

In this regard, the Commission should not require vehicular radar systems operating in the 76-77 GHz band to avoid interference with the Proposed Services or accept interference from the Proposed Services, nor should the Commission tighten the parameters applicable for vehicular radar. Otherwise, such vehicular radar systems will be tremendously more expensive, hundreds of millions of dollars may be wasted in current designs and systems, and the systems will have far less functionality with much greater costs -- if they are even produced at all.

Moreover, the use of the 76-77 GHz band is far more important to vehicular radar systems than it is to the Proposed Systems. The Commission has stated that the 76-77 GHz band is "***ideal*** for unlicensed collision avoidance radars...." In addition, vehicular radar manufacturers have already spent hundreds of millions of dollars designing and building such systems in this band. Based on proposals in Europe, the band from 76 to 81 GHz may, in ten years, very well be the only band that vehicular radar will be permitted to operate in overseas. In contrast, none of the Proposed Services are operating in the U.S. in this band. Moreover, with respect to RAS, the 76–77 GHz band is not even contained in the list of "radio frequency lines of the greatest importance to radioastronomy" published by the ITU. As for Space Research earth

stations and Amateur Satellite, Delphi is not aware of any instances where these services are being used above 24 GHz, and it does not appear that either of those services would even use this band for many years to come. Finally, the spectrum utilization concerns cited by the Commission in 1998 in not allowing access to the 76-77 GHz band by Amateur Satellite Services remain true today not only for Amateur Satellite but for the Proposed Services in general.

Delphi respectfully submits that it is critical that the Commission continue to permit vehicular radar systems to operate unencumbered by other systems in the 76-77 GHz band. Notwithstanding the actions taken in WRC-2000, explicitly protecting the domestic operation of vehicular radar systems against interference despite their unlicensed status would be consistent with Commission precedent and in accordance with the public interest.

While the 76-77 GHz band provides sufficient bandwidth for the long-range vehicular radar, it will not provide sufficient bandwidth for all anticipated mid-range and short-range vehicular radar applications. Accordingly, Delphi requests that the Commission permit vehicular radar to operate in the 77-81 GHz band as well. If the Commission believes a separate proceeding is necessary to consider this new application, then Delphi believes such a proceeding should be commenced as soon as practicable.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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COMMENTS OF
DELPHI CORPORATION

Delphi Corporation ("Delphi"), by its undersigned attorneys, hereby submits these Comments in response to the Commission's Notice of Proposed Rule Making released on April 28, 2003 in the above-captioned proceeding.[1] Delphi is a leader and innovator in the design and manufacture of automotive radar, and Delphi manufacturers vehicular radar devices,[2] including radar devices using 76–77 GHz. Delphi's Comments address, among other things, the following matters:

- The Commission should not allow the introduction of radio astronomy service (RAS), space research or amateur site services (collectively, the "Proposed Services") into the 76–77 GHz band at this time. If the Commission does permit any of the Proposed Services in the 76–77 GHz band, it should only do so if it also finds that (i) such services must not interfere with vehicular radar systems; (ii) such services must accept interference from vehicular radar systems; and (iii) the existing technical parameters for vehicular radar will not be tightened as a result of the presence of such services in the 76-77 GHz band.

- The Commission should permit vehicular radar services to operate in the 77-81 GHz band.

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[1] Notice of Proposed Rule Making, ET Docket No. 03-102, ET Docket No. 99-261, FCC 03-90 (rel. April 28, 2003) ("NPRM").

[2] See, e.g., "Ex Parte Comments of Delphi Automotive Systems Corporation" and accompanying "Engineering Study" filed under the name Delphi Automotive Systems Corporation, July 13, 2001 in ET Docket 98-153.

In support of these Comments, Delphi respectfully states as follows:

I. The Importance of Vehicular Radar to the Safety and Well-Being of the Public

Vehicular radar, if given an opportunity, will provide a tremendous benefit to our society. The number of people that are killed and injured in automobile accidents each year is staggering. The property damage caused by such accidents is overwhelming. As the Short Range Radar Frequency Allocation Group ("SARA") stated in a recent filing at the Commission:

> According to the National Highway Traffic Safety Administration ("NHTSA"), in 2001 there were over 6,300,000 police-reported motor vehicle accidents in the United States. More than 3,000,000 people were injured in those accidents (approximately one injury per every five seconds) and more than 42,000 people died (approximately one death every 12 minutes). For each of the past ten years, from 1992 through 2001, (i) more than 3,000,000 people have been injured in motor vehicle accidents – meaning that more than 30,000,000 have been injured in motor vehicle accidents over that period of time; and (ii) more than 40,000 have been killed (except in 1992 when there were 39,250 deaths) – meaning that more than 400,000 people have died over that period of time from motor vehicle accidents. In addition to the injuries and deaths from motor vehicle accidents, there is enormous property damage resulting each year from such accidents, as well as the incalculable loss of productive time by millions of Americans who are stuck in traffic -- often for hours -- because of motor vehicle accidents.[3]

Yet, so much of that death, injury, damage and destruction no longer needs to occur. And so much of it will not occur if vehicular radar systems become as ubiquitous as is currently anticipated. But to have this impact, these systems must be given a full opportunity to benefit the public. As the Commission itself has aptly concluded, "[d]epriving the public of or

[3] See SARA's "Reply Comments on the FCC's Spectrum Policy Task Force Report" in ET Docket No. 02-135, p.2 (February 27, 2003) (citing National Highway Traffic Safety Administration, "Traffic Safety Facts 2001," December 2002 (DOT HS 809,484), 2001 National Statistics and p. 85) ("SARA Task Force Report Reply Comments").

eliminating the availability of these unlicensed devices, which will enhance the safety of travel of the public via motor vehicles ***would be contrary to the public interest.***"[4]

Moreover, vehicular radar devices are the only viable option in the near future for preventing a significant portion of the seemingly countless deaths and injuries from motor vehicle accidents. As the SARA group further noted:

> Human operators, no matter how conscientious, make mistakes. These mistakes occur due to temporary inattentiveness, judgment errors, decision errors in split second accident situations, and the inability of drivers to see clearly under adverse conditions such as in heavy rain at night. As evidenced by the above statistics, regardless of the amount of training and care taken by drivers, humans cannot be excellent drivers 100% of the time. If these statistics are to be reduced significantly, technology – such as vehicle radar systems – must play an important role.[5]

The Commission's E-911 proceedings, where regulations and policies have been adopted to seek to enhance the likelihood, among other things, that wireless 911 calls can be placed and that the location of the caller can be identified,[6] place into perspective the importance of vehicular radar. Specifically, vehicular radar, if permitted to flourish, is in one critical sense even more helpful than E-911 because ***vehicular radar can, in many circumstances, completely prevent the need for the emergency call at all.*** And while Delphi recognizes that being able to call for emergency assistance when there have been injuries and damage is important, it cannot be disputed that it is much more preferable to prevent the accident in the first place. And that is what vehicular radar will do in many instances if the technology is permitted to be deployed to the public in an unimpeded manner.

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[4] "Amendment of Parts 2, and 15 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications", Third Memorandum Opinion and Order, ET Docket No. 94-124, FCC 00-161, ¶9 (rel. May 17, 2000) (emphasis added) ("Third MO&O").

[5] SARA Task Force Report Reply Comments, p. 2.

[6] See, e.g., "Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems", CC Docket No. 94-102, Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd

II. Utilization of the 76 – 77 GHz Vehicular Radar Band

In 1995, the Commission made the 76-77 GHz band available for use by vehicular radar allocations.[7] In addition to allocating the use of the band to this technology, the Commission also took another important action. It concluded that "unlicensed use of the 76-77 GHz band should be limited for the time being to vehicular radar systems."[8] The Commission acknowledged it reached this conclusion "because of safety considerations."[9] As discussed below, if anything, these safety considerations are even more prevalent today then they were then.[10]

A. Design, Production and Deployment of Vehicular Radar Systems in the 76-77 GHz band Has Commenced and Is Continuing at a Steadily Increasing Pace

In reliance upon the Commission's broad and unambiguous sanction of this technology, the vehicular radar industry has not only designed -- but it has produced and deployed to the public -- vehicular radar systems utilizing the 76-77 GHz band.[11] Use of the 76-77 GHz band is not by any means solely experimental or for development; rather, the band is now being utilized for distribution of these safety enhancement devices. The vehicular radar systems utilizing the 76-77 GHz band that the industry is currently producing and has deployed consist of Forward Collision Warning radar and Adaptive Cruise Control radar, as described below.[12]

18676 (1996).

[7] See "Amendment of Parts 2, 15, and 97 of the Commission' Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications", First Order and Second Notice of Proposed Rule Making, ET docket No 94-124, 11 FCC Red 4481, ¶¶ 15-17 (1995) ("First Report and Order").

[8] Id. at ¶20.

[9] Id.

[10] In fact, the Commission recognized in the First Report and Order that vehicular radar systems may eventually be used for vehicular control and that this anticipated usage only heightens the safety concerns regarding possible interference to these systems. Id. That eventuality has come to pass, as discussed below, and such vehicular control radar systems will be even more prevalent in the near future.

[11] The Commission has issued equipment authorizations to several entities for the sale and distribution of the radars under the 76–77 GHz Part 15 rules.

[12] With respect to Table 1 in the NPRM (see NPRM at ¶7 and Table 1), the vehicular radar industry has gone well past design with respect to both forward collision warning radar and adaptive cruise control radar utilizing the 76-77 GHZ band.

- Forward Collision Warning radar is currently used in commercial vehicle applications, and will soon be available in cars, to detect obstacles ahead and in the path of the vehicle. The radar provides several levels of audible and visual warnings to the driver to indicate an increasing level of urgency, so as to encourage the driver to take action. In many instances, these warnings can lead to the avoidance of an accident.

- With Adaptive Cruise Control, the radar maintains a preset distance from the vehicle in front of the radar-equipped vehicle (in conjunction with the standards cruise control feature), and maintains the cruise set speed determined by the driver when the road ahead is clear. Importantly, the radar controls the brakes and throttle of the car directly when engaged. Where traffic ahead slows very rapidly, and closing speed becomes too high, the Adaptive Cruise Control will apply significant braking before an inattentive driver would be able to recognize the need to do so, thus decreasing the chance of an accident. The Adaptive Cruise Control radar can also operate with the cruise control disengaged to warn the driver of slower-moving traffic ahead.

- In addition to the above devices that are currently being produced and sold, the vehicular radar industry has begun to design Forward Collision Avoidance radar that will utilize the 76-77 GHz band. This radar will be operational 100% of the time, not just at cruise control speeds, and will detect obstacles ahead and in the path of the vehicle. It will apply the brakes and throttle of the car, when a collision is determined to be imminent, thereby reducing the chance of an accident or mitigating the severity of the accident.

Production and deliveries of vehicular radar systems commenced in the late 1990s, and have continued at a steadily increasing pace since then. On a worldwide basis, it is Delphi's understanding that in excess of 100,000 vehicular radar devices in the 76-77 GHz band are on the road, and currently, approximately 3,000 such devices are sold each month. In fact, in one or more countries in the world (i) certain models of Jaguar, Cadillac, Mercedes, BMW, Nissan, Toyota, VolksWagen, Honda, and Mercedes Truck now include vehicle radar devices using the 76-77 GHz band; and (ii) suppliers of such devices include Delphi, ADC, Autocruise, Bosch, Denso and F10. While U.S. sales are currently only a relatively small portion of worldwide sales, at the very least, Jaguar, Mercedes and Cadillac are purchasing vehicle radar devices using the 76-77 GHz band for use in the United States. Moreover, U.S. sales are growing, and as discussed in the next section, there is every reason to believe that the U.S. numbers will continue to rise quickly as long as there are no regulatory impediments to such growth.

B. The Public Interest Requires that the Commission Not Allow the Introduction of the Proposed Services into the 76–77 GHz Band At This Time, or Require that (i) the Proposed Services Must Accept Interference from Vehicular Radar; (ii) the Proposed Services Not Interfere With Vehicular Radar; and (iii) the Existing Technical Parameters for Vehicular Radar Will Not be Tightened as a Result of the Presence of Such Services in the 76-77 GHz Band

Delphi respectfully submits that it is critical that the Commission continue to permit vehicular radar systems to operate unencumbered by other systems in the 76-77 GHz band. Accordingly, any spectrum allocation scheme adopted by the Commission in the 76-77 GHz band should either: (i) not allow the introduction of the Proposed Services at this time; or (ii) require that the Proposed Services accept interference from vehicular radar, provide interference protection for vehicular radar systems vis-à-vis these services while also ensuring that the existing technical parameters for vehicular radar are not tightened.

As discussed herein, notwithstanding the actions taken in WRC-2000, explicitly protecting the domestic operation of vehicular radar systems against interference despite their unlicensed status would be consistent with Commission precedent and in accordance with the public interest. In this regard, vehicular radar, when fully deployed, will make a tremendous difference in the death, injury and property damage toll each year from motor vehicle accidents. It is not an understatement to say that the vehicular radar systems on the road today, as well as anticipated next generation systems, may be the difference between life, and death or serious injury, for millions of U.S residents in the coming years. Accordingly, vehicular radar at 76-77 GHz simply does too much good for too many people to have its beneficial uses compromised by allowing the Proposed Services to operate in that band at this time unless those services are not permitted to cause interference to vehicular radar, are required to accept interference from vehicular radar, and the existing technical parameters for vehicular radar are not tightened.

1. Requiring Vehicular Radar to Not Interfere With the Proposed Services or to Modify its Technical Parameters to Accommodate Such Services Will, At a Minimum, Decrease Vehicular Radar's Functionality and Design Flexibility, Increase Its Cost and Minimize Spectrum Utilization

Currently, the parameters for vehicular radar in the 76–77 GHz band[13] are fully utilized and manufacturers are afforded sufficient spectrum and design flexibility to achieve many of the safety benefits the Commission has long encouraged in its decisions. If those parameters become more restrictive, either now or in the future, due to requirements that vehicular radar may not interfere with the Proposed Services, or if the introduction of the Proposed Services into the 76-77 GHz band undermines the ability of the vehicular radar industry to maximize the utilization of the band, the public will be greatly harmed.

a. Functionality and Design Flexibility

If the technical parameters applicable to vehicular radar in the 76-77 GHz are tightened, or vehicular radar is not permitted to take full advantage of this critical spectrum resource by being required not to interfere with the Proposed Services, vehicular radar systems will at a minimum be made less functional, and may very well be effectively forced off the road. Under either scenario, over a period of years, potentially hundreds of thousands of lives will be lost, and millions of people will be injured, solely so that the Proposed Services can operate without interference in a spectrum in which they do not even currently have an allocation in the United States, and in which vehicular radar has had rights to operate for almost a decade.[14]

Similarly, the Commission stated in the First Report and Order that it was at that time restricting use of the bands to vehicular radar systems in part because it wished to ensure that the manufacturers of such systems will have sufficient spectrum and design

[13] See e.g., 47 C.F.R. §§15.253(b),(c)(2)(ii), (d), 15.35(b).

[14] Moreover, as shown below, the Proposed Services have not demonstrated a compelling need to use this band on a domestic basis.

flexibility to develop such systems successfully.[15] In the 76-77 GHz band, vehicular radar currently has that flexibility. Delphi submits that now is not the time, just when vehicular radar is beginning to materially enhance the safety on our roadways, to remove or substantially reduce the spectrum access of this most important application of advanced radio technology.

b. Cost

If vehicular radar has to avoid interference to the Proposed Services, not only will the functionality and design flexibility of the systems be compromised, the costs of the systems will increase dramatically, most likely to levels not acceptable to the public. The cost increases would be due to two factors. First, the hundreds of millions of dollars spent on the current vehicular radar systems in the 76–77 GHz band may be wasted since the systems and designs would need to be modified to ensure there is no interference to the Proposed Services. Thus, in addition to the harm to the public described below, the legitimate investment-backed expectations of the vehicular radar manufacturers would go unrealized if that were to occur. Second, with regard to the designs themselves, far more expensive designs would be necessary to ensure that the devices would not interfere with the Proposed Services, if such designs are technically feasible at all. Of course, any material increase in costs to the vehicular radar manufacturers, and any waste of millions of dollars in designs and products, at a minimum will result in a corresponding increase in the price of the new products, if not effectively preclude the deployment of the products themselves. That, in turn, will cause a tremendous decrease in the number of people that can actually afford these safety enhancing devices in their cars, or eliminate these safety devices entirely.[16] Accordingly, just as the Commission declined

[15] First Report and Order, ¶20.

[16] Because vehicular radar must share 24 GHz band with RAS, the vehicular radar systems in that band will be significantly more expensive than they otherwise would have been without the sharing arrangement. This is due to the fact that more expensive designs are imposed because RAS claimed that such was necessary to ensure that there was no interference with their devices. But, at least in that band, because RAS was in the band first, millions of dollars were not already spent on designs that would no longer be workable - as would be the case in the 76-77 GHz

in 2000 to further restrict the spurious emission limits applicable to vehicular radar because such action "would increase the cost of these devices and result in the delay or interruption of the availability of these beneficial devices to the public",[17] the strict implementation of WRC-2000 is not, itself, sufficient justification to impede, delay or eliminate the steadily increasing, cost-effective deployment of a technology that helps to ensure the safety of thousands (and ultimately millions) of drivers and their families.

c. Spectrum Utilization

There is no question that use of the 76-77 GHz band is far more important to vehicular radar systems than it is to the Proposed Systems. As the Commission stated in the First Report and Order, and then repeated in this NPRM, the 76-77 GHz band is "***ideal*** for unlicensed collision avoidance radars because: 1) the propagation characteristics would reduce the probability of interference between vehicle radar units; 2) this band would reduce manufacturing costs; and 3) the band provided sufficient spectrum needed for tracking edges of roads and proper operation."[18] Moreover, vehicular radar manufacturers have already spent hundreds of millions of dollars designing and building such systems in this band. Based on proposals in Europe, the band from 76 to 81 GHz may, in ten years, very well be the only band that vehicular radar will be permitted to operate in overseas. Thus, to say the least, the band from 76–77 GHz is critical to the success of vehicular radar.

In contrast, none of the Proposed Services are operating in the U.S. in this band. Moreover, with respect to RAS, the 76–77 GHz band is not even contained in the list of "radio frequency lines of the greatest importance to radioastronomy" published by the International Telecommunications Union in the *Handbook on Radio Astronomy*.[19] As for Space

band if the Commission requires vehicular radar to ensure that it does not interfere with any of the Proposed Services.

[17] Third MO&O, ¶9.

[18] See e.g., NPRM at ¶6 (emphasis added).

[19] ITU, Handbook on Radio Astronomy (Radiocomm. Bureau 1995).

Research earth stations and Amateur Satellite, Delphi is not aware of any instances where these services are being used above 24 GHz,[20] and it does not appear that either of those services would even use this band for many years to come.

In light of the concrete and immediate spectrum requirements of the vehicular radar industry in the 76-77 GHz band, the Commission should be guided in this case by its analysis in 1998 when it suspended access to the 76-77 GHz band by the Amateur and Amateur Satellite Services.[21] In that decision, the Commission found, *inter alia*, that:

- "Amateur station transmissions in the 76-77 GHz band is not significant at this time. Thus, this action will not have an immediate impact on amateur operators because there is little or no use of this band."[22]

- Sufficient allocations existed to ensure the unencumbered use of the Amateur and Amateur Satellite Services.[23]

As demonstrated above, these spectrum utilization concerns, cited by the Commission in 1998 in not allowing access to the 76-77 GHz band by Amateur Satellite Services, remain true today not only for Amateur Satellite but for the Proposed Services in general.

Accordingly, there is no compelling reason for any of the Proposed Services to be allowed in the 76–77 GHz band at this time. In stark contrast, there are millions of compelling reasons to keep them out of the band (i.e. the millions of people over the years who will not be injured or killed in motor vehicle accidents if vehicular radar systems are allowed to operate unimpeded in this band). This, simply put, is one of those times where the Commission should not feel compelled to strictly follow the WRC allocations. Finally, if the Commission believes that it must follow those allocations, it should take whatever steps are

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[20] See e.g. Radio Amateur Satellite Corporation's "Amateur Satellite Frequency Guide" (April 2003); "Protection Criteria for Telecommunications Links for Manned and Unmanned Near-Earth Research Satellites", ITU Recommendation 609-1.

[21] See "Amendment of Parts 2, 15, and 97 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications", Third Report and Order, ET Docket No. 94-124, FCC 98-150, ¶8 (1998) ("Third R&O").

[22] Id.

[23] Id. at ¶9 (noting that the Commission was upgrading the status of the amateur radio services to coprimary in the

necessary to ensure that the technical parameters applicable to vehicular radar are not tightened, that the Proposed Services must accept interference from vehicular radar systems, and as discussed in the next section below, that the Proposed Services must not interfere with vehicular radar systems. [24]

2. Interference With Vehicular Radar Systems In The 76-77 GHz band Should Not Be Permitted

The Commission also should refuse to allow the Proposed Services into the 76-77 GHz band at this time to ensure that vehicular radar systems will not be interfered with in that band by the Proposed Services. In this regard, the Commission has previously determined that "[b]ecause harmful interference to vehicle radar systems could affect public safety, we will proceed with the utmost amount of caution."[25] Interference with vehicular radar systems can cause such systems to malfunction or to not perform at all.

In the First Report and Order, commenters discussed the concerns with permitting others to share the 76-77 GHz band with vehicular radar. By doing so, for example, there will be more false alarms on vehicular radar systems, and such systems will be more costly to design.[26] Those concerns, which are even more prevalent today,[27] can have very serious consequences. False alarms can cause great stress and disruption to drivers, and even quite possibly lead to accidents. Of course, interference that prevents the vehicular radar systems

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77.5-78 GHz band).

[24] If the Commission decided to take this approach, Delphi believes there may be several ways to implement it, including, for example, a type of grandfathering of vehicular radar systems or requiring RAS to take steps to ensure (e.g., shielding) its systems will not be interfered with by vehicular radar. Delphi acknowledges that vehicular radar and RAS are generally compatible, and the Commission has recognized the same. See NPRM at ¶13 ("radio astronomy entities typically control access to their telescopes at a distance of at least one kilometer to provide protection from interference caused by automobile spark plugs and other uncontrolled RFI sources. This implies that radio astronomy observatories could tolerate low-powered emissions, as long as they are not in close proximity to their telescopes"). But as shown in the UWB proceedings, there are times where RAS requests vehicular radar to take significant extra steps (including major design changes and agreement to further emission restrictions) to ensure RAS is fully protected from interference. Any such extra steps, whether sought now or later, simply cannot be required in the 76-77 GHz band if vehicular radar is going to provide the benefit to the public of which it is capable.

[25] Third R&O, ¶8.

[26] See First Report and Order, ¶18 The disadvantage of more costly designs is discussed earlier in these comments.

[27] Unlike in the past, usage of mm wave vehicular radar is now substantial and growing.

from working at critical times will block such systems from preventing otherwise avoidable accidents.

Providing interference protection to vehicular radar despite its unlicensed status would, again, be consistent with the Commission's actions in the Third R&O, where the Commission suspended access to the 76-77 GHz band by the Amateur and Amateur Satellite Services "in order to ensure against potential interference to vehicle radar systems...."[28] In that case, the Commission found that:

- "[W]e are unable to ascertain what future amateur station transmissions might take place in this band and therefore cannot evaluate the potential for interference to vehicle radar systems."[29]
- "[U]ntil additional studies are performed to measure in-band and out-of-band interference to vehicular radar systems in the 76-77 GHz band and usable spectrum sharing standards are developed, amateur stations should not have access to this band.[30]

These interference concerns, cited by the Commission in 1998 in not allowing access to the 76-77 GHz band by the Amateur Satellite Services, remain true today not only for Amateur Satellite but for the Proposed Services in general. Therefore, the Commission should once again take the steps necessary to protect vehicular radar from interference.

The safety of many thousands of motorists today, and millions in the near future, depends in part on the reliable performance of their vehicular radar devices, which can only be ensured by a lack of interference from other services in the 76–77 GHz band. The risk of interference in this band will only get worse over time. The development trend for the vehicular radar products is increasing capability (faster response times, larger fields of view, etc.), allowing them to become a key component in the advanced automotive safety systems of the future. These safety systems will have extraordinary crash prevention/mitigation capabilities by

[28] See Third R&O, ¶8.
[29] Id.
[30] Id.

today's standards. Given current trends, the roadways will become safer and safer every year due to the expanding population and capabilities of vehicular radar, many of which will be mm wave vehicular radar. In order to support the future envisioned capability of the mm wave vehicular radar, interference protection levels 10 to 15 db *lower* than needed now will be necessary.[31] Failure to provide interference protection for the mm wave vehicular radar will detrimentally impact the otherwise achievable goal of far greater safety on the roadways.[32]

In sum, for all of the reasons set forth in Sections I and II above, whatever benefits may exist to allocating additional services in the 76-77 GHz band at this time, such benefits are outweighed by the detriments to vehicular radar systems, and society in general, from allowing others in this band (or at the very least from permitting others to interfere with vehicular radar, requiring that vehicular radar must not interfere with them, or tightening the technical parameters applicable to vehicular radar in this band).

III. Utilization of the 77–81 GHz Band

While the 76-77 GHz band provides sufficient bandwidth for the long-range vehicular radar, it will not provide sufficient bandwidth for all anticipated mid-range and short-range vehicular radar applications. Indeed, in the ultra-wideband proceeding, as the Commission's 22-29 GHz allocation showed, the Commission recognized that vehicular radar will often need greater bandwidth. Moreover, as indicated previously, the European regulatory bodies are seriously considering permitting vehicular radar to operate in the entire band between 76 GHz and 81 GHz.

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[31] This is due to the fact that these future systems will be detecting objects at even further distances and over wider fields of view than they do now, which will enable these systems to provide accident scenario detection and prevention in many more driving situations than they do currently.

[32] Due to the directive nature of the receive antennas in this type of vehicular radar (mm wave), required interference protection levels are consequently a function of the incidence angle of the interference. In the case of today's designs, on boresight, a typical 76 GHz vehicular radar can tolerate up to 30 pW/cm^2 incident narrowband power density. Through a vehicular radar antenna sidelobe angle, up to 1000 pW/cm^2 of narrowband interference may be tolerated.

Accordingly, Delphi requests that the Commission permit vehicular radar to operate in the 77-81 GHz band as well. Given the importance of vehicular radar as shown above, Delphi believes that such an allocation is warranted. If the Commission believes a separate proceeding is necessary to consider this new application, then Delphi believes such a proceeding should be commenced as soon as practicable.

IV. Conclusion

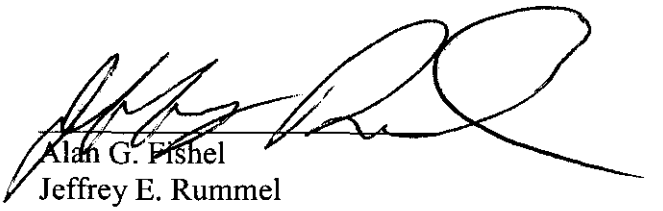
Notwithstanding WRC-2000, there has been no substantive change of circumstances that justifies the Commission discarding its prudent policy of "proceed[ing] with the utmost caution"[33] with respect to vehicular radar. Not allowing the introduction of the Proposed Services into the 76-77 GHz band at this time or, in the alternative (i) providing interference protection for vehicular radar systems vis-à-vis the Proposed Services; (ii) requiring the Proposed Services to accept interference from vehicular radar systems; and (iii) not tightening the existing technical parameters for vehicular radar as a result of the presence of such services in the 76-77 GHz band, will not harm either the operation or the growth of the Proposed Services, which have demonstrated no compelling need, in a domestic context, for the proposed new allocation. On the other hand, the Commission has repeatedly and affirmatively acted to encourage the operation and growth of vehicular radar systems in the 76-77 GHz band and its reasonable approach to regulation in this area has set the stage for full utilization of the band by vehicular radar systems.

[33] See p. 11, supra.

For the reasons set forth herein, the Commission should adopt rules consistent with the comments and proposals of Delphi, as specified in these *Comments*.

Respectfully submitted,

DELPHI CORPORATION

By: 

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